HUDSON RIVER SUSTAINABLE SHORELINES PROJECT

Intended Users of this science
- Coastal & marine engineers
- Municipal officials
- U.S. Army Corps of Engineers
- NYS Dept. of Environmental Conservation
- NYS Div. of Coastal Resources
- NYS Office of Climate Change
- NYS Climate Action Council
- NYS Energy Research & Development Authority
- The Nature Conservancy
- Scenic Hudson, Inc.

Project Team Partners
NYS Dept. of Environmental Conservation, Hudson River NERR, Hudson River Estuary Program, Consensus Building Institute, Cary Institute of Ecosystem Studies, Stevens Institute of Technology

What's happening?

Led by the Hudson River National Estuarine Research Reserve (NERR), this multi-organizational, technical pilot is providing information about the physical forces shaping Hudson River shorelines, the ecological impact of different constructed shorelines, and the performance of innovative shoreline stabilization structures. The team is working with stakeholders to share this information so it can be used to make decisions about waterfront planning, shoreline development, policy, and regulations.

Why this project?

In 2006, a group of New York resource managers had an "aha" moment. Vital habitats of the Hudson River Estuary were in trouble—more than they had imagined. Development pressure was heating up with the housing bubble. Flooding was on the rise, as were permits for "hard shore" reactions like bulkheads and riprap. Zebra mussels were stripping native life out of the water column. Projections of sea level rise were the coup de grace. They pointed to increases of up to four feet by the century's end, and in this largely rock-bound, steep-sloped estuary, there is little room for wetlands to retreat. Where the shoreline would go—and whether it would take its habitats with it—depended on a regulatory environment lacking key information.

These habitat managers knew that responding to this perfect storm of pressures would require strong collective action. In response, a team led by the

Hudson River NERR launched the Sustainable Shorelines Project in 2008. The second phase of this multi-stakeholder initiative is being supported by a NERRS Science Collaborative grant.

Local context

This project focuses on the 127-mile stretch of the Hudson River between the Tappan Zee Bridge and the Troy Dam. There, the shoreline is battered with wind-driven waves, ice scour, and the wakes of recreational boats and large commercial vessels. Flooding and storm surges also occur. To combat erosion and accommodate working waterfronts, roughly 41 percent of shoreline has been reinforced with riprap, bulkhead, or cribbing. Land use decisions like these are made within a complex legal and regulatory framework. Along this part of the Hudson, approximately 1.3 million people live in 79 municipalities, each with its own set of land use ordinances, and each with a tradition of home rule. While these communities could adopt innovative shoreline regulations, they lack information about the economic and environmental tradeoffs of different approaches to stabilization, and any decision they make is subject to legal challenge. Fortunately, the situation is changing. Two regional action plans are calling for state agencies to consider sea level rise in policies related to shoreline management and coastal land use, and to provide the technical guidance needed to implement these changes.

Hudson River
National Estuarine
Research Reserve

NATIONAL ESTUARINE
RESEARCH RESERVE SYSTEM
SCIENCE COLLABORATIVE

NOAA

UNIVERSITY
of NEW HAMPSHIRE

Fish sampling during the first phase of the Sustainable Shorelines Project.

Project Progress

With the ongoing input of decision-makers and intended users of project results, the team is generating new information about engineering performance, ecological tradeoffs and economic costs of different shoreline structures, projected river conditions, legal and regulatory opportunities, and the needs and priorities of key audiences. Their work has generated:

- A project website, www.hrnerr.org/ hudson-river-sustainable-shorelines, where intended users can find reports and products, a document of standard definitions of terms, and results of a kayaker and angler survey.

- A literature review of shoreline engineering methods, describing more than 25 existing methods, their design and construction, adaptability, advantages, and disadvantages.

- A lifecycle cost analysis study, describing scenarios over 70 years that found that some ecologically enhanced shoreline methods are cost competitive with more traditional methods under current rates of sea level rise and projected rapid ice melt rates.

- Measurements of boat wakes and wind at sites along the Hudson to inform a physical forces study.

- A Rapid Assessment Protocol (RAP) for ecological function of the shore zone tested with high school and college students. It enables those without ecological expertise to evaluate ecological components within a hour or two.

- A refined New York Harbor Observing and Prediction System (NYHOPS) model to generate more accurate information about currents and waves in the Hudson Estuary.

- Field work exploring the ecology of engineered shorelines to identify which hardened or engineered shorelines are better for natural communities.

- Analysis of all ice records since 2005, incorporated into a new Hudson River ice climatology dataset, that will aid pilots in navigation and support their ability to accurately estimate and manage cargo volume and transit times.

- Collection and analysis of field and analytical data on wake energy at 30 sites on the Hudson River to predict maximum expected wake.

- A shoreline demonstration site where restoration techniques are being monitored. Photos: www. hrnerr.org/hudson-river-sustainable-shorelines/demonstration-site-network/.

- Development of an assessment and rating system that engineers can use to identify shoreline protection projects that represent the best management practices.

- A legal framework analysis.

Updated on October 12, 2012